There is also given an account of the structure of the scale-like leaves, which cover the stems under-ground. These consist of a strongly mechanical tissue, which encloses the mestome-bundles, which here often contain a mere leptome. This, as it seems, peculiar fact is, however, easily explained, since the function of such leaves is not assimilatory; they do not need, therefore, the elements of the hadrome, but merely the leptome, for the supply of already prepared organic matters. The function of the strongly developed stereome in these leaves is not only to protect the leptome, but also to form a kind of support to the entire stolon.

As regards the endodermis, the author states several variations in the stolons, which he has examined, and which he refers to two groups: the so-called O-endodermis, the cells of which are thickened equally all around, while in the second one, the C-endodermis, it is merely the inner and the radial walls in which a thickening has taken place. A double endodermis was observed in some species of Triticum, Calamagrostis and others. (The writer takes here the opportunity to call attention to similar studies upon our native grasses, in which the vegetative propagation is so strongly predominant, and which might give still more extended illustration of the characters enumerated above.)—THEO. HOLM.

Studies upon germination.[1]

In a recent paper[1], Hildebrand describes the germinating plantlet of *Cecropia peltata* upon which he has observed a long series of different forms of leaves, from ovate to cordate, gradually succeeded by peltately three or five-lobed leaves until finally the typical form appears in the nine-lobed leaf. He shows also the gradual development of the "domatia" at the base of the petioles, in which the protecting ants take up their residence and feed upon a certain kind of exudation. These domatia are not present, however, at the very earliest stage of the plantlet, and the plant is therefore forced to provide another kind of protection against the climbing, leaf-eating ants. This is done by short branches developing from the lower leaves, having merely two sessile stipules, which are bent downwards and thereby prevent the animals from climbing the stem. It is only when about the twentieth leaf is de-

[1]Fr. Hildebrand: Einige Beobachtungen an Keimlingen und Stecklingen. Botan. Zeitung, 1892, Nos. 1, 2 and 3.

veloped that the stem has attained a sufficient thickness to give shelter to the protecting ants and to produce the exudation. The author has also observed a similar fact concerning the protection of ants in *Acacia cornigera*.

Another interesting fact, to which the author calls attention, is the difference in germination of closely related species. It is especially striking in the genus *Anemone*, and the more if we include the subgenera *Pulsatilla* and *Hepatica*. In *Anemone nemorosa*, for instance, the cotyledons are under-ground, and the first leaf is three-lobed; in *A. blanda* the petioles of the cotyledons are connate so as to form a long tube above ground, as also in *A. narcissiflora*. On the other hand the cotyledons of *A. fulgens* are above ground and normally with separated petioles, while some specimens differed by the partly, or in some cases even completely, connate petioles, as in *A. blanda*. In these species the plumule was kept under-ground, and it is now interesting to see, that in *Hepatica triloba* the plumule is above-ground, the cotyledons free, but here the first developed leaf is scale-like so as to protect the plumule in the first year. In some instances this scale-like leaf was replaced by a small three-lobed or reniform one. *Hepatica angulosa* germinates in the same manner as *Hepatica triloba*, while *Pulsatilla vulgaris* and *P. pratensis* differ from the other ones by having the plumule above ground with the first developed leaves of normal shape. The author describes also the germination of some species of *Dentaria*, which show similar differences.

That the shape of the leaves may depend on certain external causes is shown by *Oxalis rubella* and *Asarum*. In Oxalis the first leaf after the cotydedons is quinate, while the following is fleshy and scale-like; but when the first leaf is cut off the succeeding one attains its quinate shape instead of being scale-like. Asarum develops some scale-like leaves immediately after the cotyledons, and the author shows that by cutting off the blades of the cotyledons, some specimens of Asarum developed two small nearly normal leaves instead of the scale-like ones.—THEO. HOLM.